

A new species of *Linognathus* (Phthiraptera: Linognathidae) from the feet of an African antelope

by

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A new species, *Linognathus nevillei*, is described from specimens found on the feet of the antelope *Aepyceros melampus* and apparently confined to this part of the host's body. The relative size of the spiracles as an indication of the biotope in *Linognathus* is discussed.

Following the discovery and description of *Linognathus digitalis* Kleynhans, 1968, a species apparently confined to the interdigital fossae on the feet of its host, several workers in South Africa have paid attention to examining the feet of other antelopes, on the supposition that further species of anopluran lice adapted to living in this biotope await discovery; the first result of these investigations is reported here.

Mr E. M. Nevill of the Division of Entomology, Veterinary Research Institute, Onderstepoort, examined the feet of an Impala, *Aepyceros melampus*, collected in the Loskop Dam Nature Reserve, Transvaal. The feet were severed at the fetlock and inspected microscopically, followed by solution of the skin in hot 10% potassium hydroxide. A number of lice in all stages of development were retrieved. A second animal collected later at the same locality and subjected to similar treatment yielded further specimens. This material is herewith described as a new species, named in honour of the collector.

In the description that follows, all measurements are in millimetres; a value in parenthesis following a statement of range represents the mean. All quantitative data are based on a sample of 10 specimens of each sex and all specimens examined were mounted in canada balsam on glass microscope slides.

***Linognathus nevillei* spec. nov., figs 1-5**

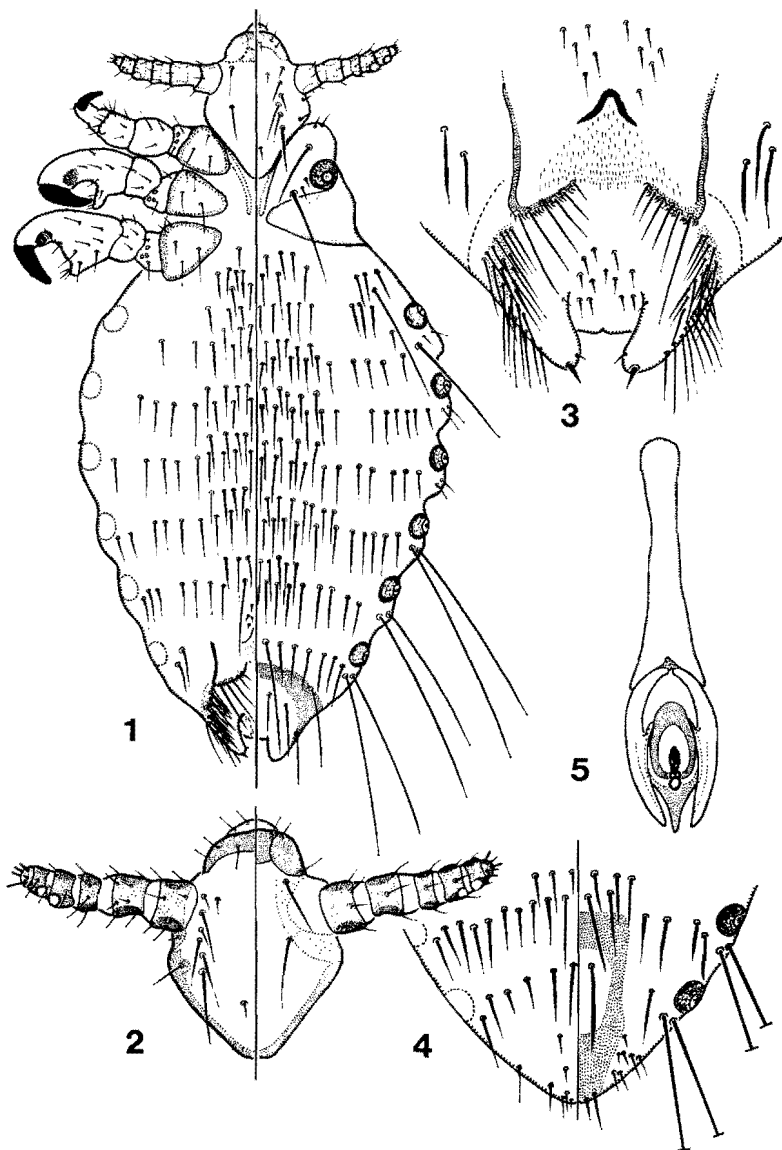
Type host: *Aepyceros melampus* Lichtenstein, 1812 (Bovidae: Aepycerotinae)

HOST DISTRIBUTION. Mainly in the Southern Savanna, but not extending to the southern limits of this zone, nor in the northwest of it; occurs marginally in the South West Arid Zone in northern and eastern Botswana, formerly also extending into the northern Cape Province and perhaps into the South West Arid Zone, south of the Okavango River (Ansell, 1968).

FEMALE. General appearance and chaetotaxy as in fig. 1.

Head. As in fig. 2; forehead short and bluntly rounded, post-antennal margins convex, hind-head tapered.

Thorax. One long, 2 short pronotal setae each side; 1 long, 2 short setae associated with each spiracle; sternal plate lacking.



Figs. 1-5. *Linognathus nevillei* spec. nov. 1. Female. 2. Female head. 3. Female genitalia. 4. Male terminal abdominal segments. 5. Male genitalia.

Abdomen. Fairly short and broad. Atrial diameter of spiracles 0.047–0.052 (0.049) mm. Long, stout lateral setae present on segments II (one seta), III (one seta) and VI–VIII (two setae each side).

Dorsal chaetotaxy. Most tergites with two rows of setae, the anterior row confined to the middle part of each segment. Setae of I and II could not be separated and counts for these segments are combined. Observed range of tergal setae: I & II, 25–40; III, 21–28; IV, 23–31; V, 25–34; VI, 28–35; VII, 22–30; VIII, 15–22. Terminal tergite usually with 4 + 4 setae.

Ventral chaetotaxy. Setae arranged in two rows on most segments; elements of I & II not separable. Observed range: I & II, 8–14; III, 14–17; IV, 18–23; V, 16–26; VI, 18–26; VII, 13–21; VIII with 1–3 setae lateral to gonapophyses each side.

Genitalia. As in fig. 3. Median sclerotisation lacking; gonapophyses with almost parallel lateral margins, apices slightly divergent. Mesal margins short, merging with vulval margin which is clothed with microtrichia, these extending into the genital chamber.

MALE. Similar to female in general appearance, somewhat smaller.

Abdomen. Remarks on female abdominal chaetotaxy apply to male as well. Terminal segments as in fig. 4. Spiracles proportionally smaller.

Dorsal chaetotaxy. Observed range: I & II, 23–42; III, 21–33; IV, 19–28; V, 23–31; VI, 27–32; VII, 23–30; VIII, 11–19.

Ventral chaetotaxy. Observed range: I & II, 8–17; III, 11–18; IV, 11–23; V, 15–26; VI, 13–23; VII, 10–18; VIII, 2–5.

Genitalia. As in fig. 5.

MEASUREMENTS.

	<i>Females</i>	<i>Males</i>
Head width . .	0.18–0.21 (0.19) mm	0.17–0.19 (0.18) mm
Head length . .	0.25–0.27 (0.26) mm	0.23–0.25 (0.24) mm
Total length . .	1.30–1.46 (1.37) mm	1.04–1.13 (1.08) mm

MATERIAL EXAMINED. HOLOTYPE. ♀ ex *Aepyceros melampus*, Loskop Dam Nature Reserve, Transvaal, South Africa (E. M. Nevill, 19.xi.1970). PARATYPES. 29 ♂, 34 ♀, same data as holotype, collected on 2.x.1970 and 19.xi.1970. The holotype is deposited at the Veterinary Research Institute, Onderstepoort; paratypes at the same institution, the South African Institute for Medical Research, Johannesburg, the Frost Entomological Museum, Pennsylvania, the United States National Museum, Washington and the British Museum (Natural History), London.

DISCUSSION

Linognathus nevillei is distinguished from all other members of the genus by the combination of small size, large spiracles, form of female genitalia with median sclerotisation lacking and the abdominal chaetotaxy. I find it impossible to suggest potential affinities between the new species and any described species, except to mention that there is a superficial resemblance between *L. nevillei* and members of the *pithodes* species-group (reviewed by Ledger, 1971). Members of the latter group are characterised by lanceolate abdominal setae and have long, paired setae laterally on segments IV–VIII.

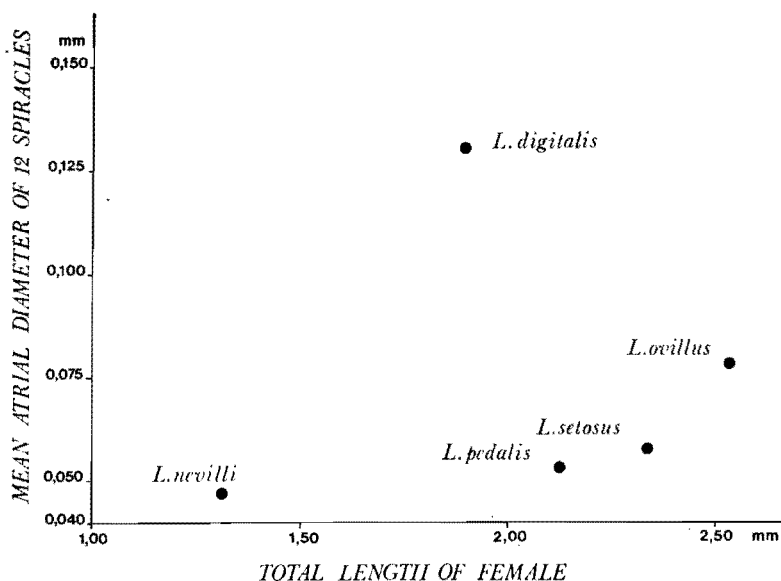


Fig. 6. Mean atrial diameter of abdominal spiracles plotted against total length of five female *Linognathus* species.

Although *L. nevillei* has some slightly flattened abdominal setae, these do not approach the true lanceolate form of those of the *pithodes* group.

Webb (1946) suggested that the structure of the spiracle in the Phthiraptera may be used as a guide to their phylogenetic relationships, basing his argument on the theory that specialisation of the spiracular atrium has arisen in response to the need for removing dust from the incoming air current, and that the pelages of the various host groups differ in the amount of dust particles present. It is known that several species of *Linognathus* may occur on the same host species, the greatest number recorded being five species from the antelope *Antidorcas marsupialis* (see Kleynhans, 1968). Nothing is known about the spatial distribution of these five species on the body of the animal, except that *L. digitalis* appears to live only in the interdigital fossae; this species has a remarkable appearance due to the extreme development of the spiracles. The only other *Linognathus* that appears to be restricted to the feet of its host is *L. nevillei*. It may be instructive to compare spiracle size in these two species with that of other *Linognathus*, and in fig. 6, this has been done graphically for *L. digitalis*, *L. nevillei*, two species from the domestic sheep, *L. ovillus* (Neumann, 1907) and *L. pedalis* (Osborne, 1896) and the species from the domestic dog, *L. setosus* (von Olfers, 1816). The latter species were chosen for comparison because previous authors (e.g. Ferris, 1932) have commented on their large spiracles, describing them as "strikingly large", "noticeably large and conspicuous" and the like. I regard such subjective statements, unsupported by measurements, as misleading; broadly speaking, one would expect a large louse to have larger spiracles than a small species. In fig. 6 the mean atrial diameter of the abdominal spiracles is expressed as a function of total body length to give a more meaningful indication

of relative size. Better measurements would be atrial volume, or internal surface area, but these would be difficult figures to obtain. Fig. 6 indicates that relative spiracle size in *L. digitalis* and *L. nevillei* is of a different order to that of the other three species, and it will be interesting to discover whether further lice proven to be confined to the feet of the host will show a similar trend. In this regard it should be noted that, despite its specific epithet, *L. pedalis* is not confined to the feet of sheep, but spreads up the legs to the belly when infestations are heavy (Murray, 1960).

On the limited evidence available, it appears that the two species of *Linognathus* known to have occupied the niche available on the feet of African Bovidae are characterised by having relatively large spiracles. The latter adaptation is presumably due to the conditions prevailing in the microhabitat, of which high dust levels and fluctuating temperature and humidity are probably the most important.

ACKNOWLEDGEMENTS

I thank Mr E. M. Nevill for entrusting the new species to me for description, Dr F. Zumpt for supervising my work and the Director of the South African Institute for Medical Research for facilities provided. Studies on Arthropod parasites of African Vertebrates are supported by a grant from the South African Medical Research Council.

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Manuscript received 14 August 1972.